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Herbalism, Home Gardens, and Hybridization

Wôthihã Medicine and Cultural Change

Using the example of the Wôthihã of the Manapiare River Valley, Amazonas State, Venezuela, I challenge the image of the indigenous Amazonian as an expert in herbalism. I argue that the observed absence of medicinal plant use in early Wôthihã ethnography, rather than reflecting researcher oversight, reflects the centrality of shamanism. According to Wôthihã shamanic cosmology, herbal medicines, while useful to relieve symptoms and treat minor injuries, fail to address the underlying cause of illness. Using a combination of quantitative and qualitative methods, I find that as the role and influence of shamanism have dramatically decreased, the Wôthihã have turned elsewhere for medical treatment. Biomedical remedies have shown to be effective, thereby encouraging an acceptance of symptom-specific treatments. Biomedicine's patchy availability, however, has encouraged the Wôthihã to look beyond biomedicine. Several folk healing traditions are being incorporated by the Wôthihã, each with its own herbal tradition.

Keywords: [Wôthihã, herbal medicine, home gardens, traditional medicine, Piaroa]

A dichotomy exists in Amazonian literature between those researchers who describe medical systems primarily in terms of shamanism and those who focus almost exclusively on medicinal plants. This is assumed to reflect conceptual divisions inherent in Amazonian cosmologies and elucidated by researchers with different analytical foci: some researchers are concerned with the (often) male world of shamanism, its underlying cosmology, and the meaning behind specific healing rituals (e.g., Briggs 1994; Green 1998), whereas others are concerned with the (often) female world of practical, symptom-based therapy in which medicinal plants play a prominent role (e.g., Browner 1991; Shepard 2004; Wayland 2001). This, then, sets up two domains within the larger domain of "local medical knowledge" that can be analyzed in opposition to biomedicine, Christianity, and other exogenous institutions.

The complex relationship between biomedicine and medicinal plant knowledge (Wayland 2003) and the role of shamanism in mediating the drastic socioeconomic changes of the late 20th century (Taussig 1987) have been subjected to valuable scrutiny. However, neither the relationship between medicinal plants and shamanism nor the role of medicinal plants in this period of socioeconomic change has been

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adequately described. By considering all these healing domains together, I find evidence of previously undescribed interactions; for instance, in this case, biomedicine encourages the use of herbal medicines, while the deeply embedded and spiritual nature of shamanism may have discouraged their use. Furthermore, by considering not only whether or not medicinal plants as a general category are known or used but also which plants are used, how they are used, and in what contexts, I find evidence of a profound shift in Wôthihã conceptions of illness and correlated treatment-seeking behavior, thereby demonstrating the contribution that ethnobotanical data may make to medical anthropology.

Medicinal Plant Use in Amazonia

The shamanism–medicinal plant dichotomy is illustrated by the Yanomami case. Early claims that the Yanomami did not use medicinal plants (Chagnon 1968:52) or, as Biocca (1979) claims, were “ignorant” of them (Milliken and Albert 1996:11) were rebutted when Milliken and Albert published an inventory of 113 medicinal plant species collected from one community alone. Their (Milliken and Albert 1996:13) explanation for the acknowledged rarity of the use of these medicinal plants is the introduction of biomedicines, which were uniquely effective against introduced epidemics. They (Milliken and Albert 1996:14) also blame epidemics for a knowledge bottleneck in which many of the primary medicinal plant practitioners (i.e., older women) died without passing on the bulk of their knowledge. However, note the distinction between Chagnon’s claim that medicinal plants were not *used* and Milliken and Albert’s claim that they were *known*. Milliken and Albert admit that medicinal plant use was rare and that knowledge was in a “precarious state” in which most of the knowledge documented “was that which a few of the older men had picked up from their mothers and grandmothers” (1996:11, 14).

The development of ideas about medicinal plants in Wôthihã ethnography runs parallel to the Yanomami case. Most ethnographers writing before 1995 fail to mention herbal medicines at all (Boglár 1971, 1982; Mansutti 1988; Monod 1970, 1987; Oldham 1997; Overing and Kaplan 1988; Overing-Kaplan 1975:236), and Anduze states that “the [Wôthihã] have a profound understanding of the environment that surrounds them However, . . . in certain aspects they are deficient: in their knowledge of medicinal plants for example” (1974:113). This claim was challenged by Zent, who published an account of 114 plant taxa of “medicinal use” that the Wôthihã of the Upper Cuao River “recognized” (1997:340).

A large proportion of those herbal remedies address highly salient symptoms such as stings and venomous bites, diarrhea, cough and sore throat, minor cuts, and dermatological problems (Zent 1997:341). Zent (1997:340) explains that the oversight of previous ethnographers reflects an emic distinction between two Wôthihã treatment categories: shamanism and herbalism. The curing techniques used by shamans are only known by a few men and are considered to be arcane. Herbalism is considered to be profane and general knowledge, obtained through decades of informal, experiential learning. Again, however, there is an implicit distinction between knowing a plant and using it: Zent (1992:103) states elsewhere that shamanism is considered to be the most fundamental and efficacious of the two treatment categories—the

first recourse when someone falls ill—whereas herbalism is only resorted to if and when shamanism is not effective.

This sentiment is echoed by Milliken and Albert, who state that shamanism is “indisputably the most evident and the most important aspect of [Yanomami] traditional healing” (1996:10–11). This is in direct contrast with my own observations among the Wôthihã, where use of plant medicines was frequent and often the first course of action, whereas shamanism was infrequent and often a last resort. This contrast was especially surprising because the Wôthihã with whom I worked were more integrated into the national society: not only did they have easier access to biomedicine, but they demonstrated significantly less general knowledge of forest plants than the inhabitants of the Upper Cuao River would be expected to demonstrate (Heckler 2002; Zent 2001).

The Wôthihã

The Wôthihã (Piaroa) are usually placed in the Sálivan language group (Krute 1988:322), which is unaffiliated with most of the neighboring ethnic groups, including the Yanomami and the Yabarana. The most recent census estimates the number of Wôthihã to be between 12,000 and 13,000, living primarily in Amazonas State, Venezuela, but with a few hundred in Bolívar State, Venezuela, and on the left bank of the Orinoco in Colombia.

Demographic Change

Since the 1950s, the Wôthihã, like other indigenous groups in the Venezuelan Amazon, have been integrating into the national culture (Mansutti 1988, 1995). Government programs have greatly encouraged this integration by establishing sedentary communities with ready-built concrete-block houses, schools, medical clinics, and access to markets along navigable rivers throughout indigenous territories (Perera 1995). This has had a profound effect on Wôthihã demographics. In 1970, it was estimated that there were 4,000 Wôthihã living primarily in widely dispersed seminomadic groups in an inaccessible upland region (Anduze 1974). Today, very few Wôthihã remain in the headwater regions of their homeland. These “headwater” Wôthihã are said by the riverine Wôthihã to live *como adenante* (lit., “as before”), with little contact with *criollos* and minimal access to schools, biomedical health care, markets, and state politics.¹ Today, the majority live in settled, mapped communities along navigable rivers, including barrios within multiethnic communities (Oficina Central de Estadística e Informática [OCEI] 1995; Zent 2001:192). Government officials, including health and education specialists, visit most or all of these settlements regularly.

This marked and dramatic shift in demography and orientation is reflected in a general division in the Wôthihã ethnography. Before 1995, it focuses on headwater Wôthihã (e.g., Boglár 1971, 1982; Monod 1970, 1987; Overing 1981, 1989; Overing-Kaplan 1975; Zent 1992; for an exception to this, see Mansutti 1988, 1990); ethnography published after 1995 is more concerned with the consequences of the demographic change (e.g., Freire 2002; Heckler 2001; Melnyk 1995:331; Oldham 1996; Zent 2001). Health is a major contributor to this demographic shift.

Indeed, one of the primary reasons given by the Wōthihā with whom I spoke for moving from interfluvial to riverine communities was to seek medical treatment.

Headwater Shamanism

A recurring theme in Wōthihā ethnography is the importance of a certain kind of “essential force” (Oldham 1997:232) or “productive power” (Overing 1989) that originally stems from the gods and flows through the forest and through people. It is responsible for the production of game animals, fish, crops, and babies; without it, life is impossible, but it can overwhelm people and become a negative force. Indeed, most illness episodes are attributed to improper or unmediated contact with forest beings allowing an improper flow of productive power (Oldham 1997:230; Overing and Kaplan 1988:397–398). The shaman’s role is not only to intervene in each illness episode as it occurs but also to understand and mediate the flow of this productive power. They do this through a variety of activities, including removing a shamanic “dart” that has been embedded by witchcraft in the patient’s body (see also Oldham 1997), performing rituals to rid bad feelings that cause illness and hysteria in entire communities, or singing to maintain properly social relations with the animals, spirits, and gods that populate the cosmological landscape (Boglár 1971; Overing 1989:168–171). Zent (1992:289–290), in his detailed time-allocation study of the Upper Cuao Wōthihā, reports that this singing is the most common shamanic activity, occurring every night.

A resident shaman is necessary to protect people from unmediated contact and improper use of this productive power. Because shamans are so close to the productive power, they have the potential to be particularly dangerous and must be made safe by engaging them in properly domestic exchange relationships, namely, sharing daily activities, eating, and working together with families (Overing 1981). The end result is that virtually all headwater communities consist of a shaman with an extended family group living in a single roundhouse (Overing-Kaplan 1975).

But shamans have another role that is only beginning to be appreciated by ethnographers. Beginning with Santos-Granero (1991) but crystallizing in the important volume edited by Overing and Passes (2000), a radical rethinking of Amazonian society has forced a conclusion that “the intimate, informal relationships of the everyday [are] the primary concern of most Amazonian peoples and take up most of their time and energy” (Overing and Passes 2000:9). Amazonists are increasingly recognizing that the healthiest community is the one in which everyday activities are carried out in a context of tranquil, intimate relationships, a lifestyle that indigenous Amazonians often refer to as “living well” (Belaunde 2001; Gow 2000:52).

Caring for children, working a garden, and sharing these activities with other family members, rather than being “too unimportant” for prominent persons such as shamans, are the necessary foundations of a healthy and productive community. In sharing domestic duties, shamans fulfill important functions that enhance the proper development of their communities and demonstrate that they have not been driven mad by their nighttime activities and so will not use their power to harm those around them (Overing 2003:298–302, 309–310). Hence, shamans’ roles as ritual healers do not preclude their importance as alloparents, kinsmen, and community members. In fact, shamans are fully embedded in the family unit: they constantly

and casually interact with community members, and, crucially for the discussion here, they are included in normal discussions about minor illness episodes as they occur. As a result, shamans generally become involved in illness episodes very early on, largely superseding the role of the “informal healer” that exists elsewhere (e.g., Finerman 1989). Furthermore, these illness episodes are often seen as symptoms of underlying problems with the productive power and affective state of the patient; hence, if a shaman is on hand—which, in a headwater community, he almost always will be—herbal medicines are deemed largely unnecessary.

I was regularly told that shamans are the most knowledgeable about all types of plants, but there is little evidence, either in the literature or in my own research, of Wõthihã shamans using medicinal plants. Although shamans use particular plants for rituals, including *Nicotiana tabacum* (tobacco) and *Anadenanthera peregrina* (yopo), these plants are not usually used by the patient and do not treat symptoms but, rather, initiate and maintain trance.

The picture that emerges from the pre-1995 literature and corroborated by my own interviews with shamans and laypeople about life “in the forest” (Wõt. *yo, de’ana*) or “before” (como adenante) is a medical system largely controlled by shamans, with evidence of limited, nonspiritual, symptom-specific treatment, namely, medicinal plants, being applied by older men or women as supplements to the primary treatment. To document how illness cosmology has changed and to better understand how it relates to changes in other aspects of Wõthihã life, I collected three data sets, two quantitative and one qualitative.

Methods

The quantitative and qualitative data were collected during a comparative study of three communities, supplemented by surveys of six others carried out between 1997 and 1999, with a follow-up visit in 2004. Seven of these communities are in the Manapiare municipality; the other two are near and in the state capital, Puerto Ayacucho. San Juan de Manapiare, Guara, and Caño Seje are located along the upper reaches of the Manapiare River Valley; some of the residents are related to each other and visit each other regularly, a situation typical of all Wõthihã communities. However, certain key factors relating to their interaction with the national culture are different.

The Communities

Three general categories of Wõthihã settlement emerged from the survey I conducted: (1) “traditional,” that is, small (<60 residents) and isolated, founded and constructed by the residents, and operating an almost entirely subsistence economy; (2) government-built, indigenous communities, usually larger than traditional communities (30–300 residents), with concrete-block houses, primary schools, and sometimes clinics, often with airstrips, roads, or large ports, included in government development programs; and (3) neighborhoods or communities within larger multiethnic towns, usually economic hubs, often run by nonindigenous governments. The three communities highlighted in this study were chosen as representatives of each of these categories.

Caño Seje is relatively isolated (some 30 kilometers upriver from San Juan) and ethnically unmixed, with a population of approximately 30 people organized along kinship lines and a shaman as patriarch. Only three in-marrying members of the community spoke Spanish with any degree of competency. The residents lived in four palm-roofed houses clustered together, and they cooked, ate, hunted, gardened, and rested together. Although a small amount of cacao (*Theobroma cacao*) was traded via the regional agricultural cooperative, direct involvement with criollo society was minimal. There was no land pressure and no direct encouragement to remain sedentary. All of these features indicate that Caño Seje, despite its contact with San Juan and periodic visitors, maintains a typically Guyanese social and economic structure (see Overing 1981; Rivière 1984); as such, it can be used, with care, as a proxy for headwater communities.

The community of Guara is located seven kilometers south of San Juan. The majority of residents lived in small concrete-block houses that were built by the government in the 1970s. At the time of my study, all but two of the approximately 50 residents were Wôthihã. Guara had a primary school and was successfully involved with a regional agricultural cooperative, sending cacao, plantains (*Musa* spp.), and cattle downriver to the state capital in exchange for manufactured goods, biomedical treatment, and transport. Because of its proximity to San Juan, there was no health clinic or paranurse in Guara, but it did receive regular visits from government agencies, including three from the agency for malaria control during my stay. Approximately 25–30 percent of the community spoke some Spanish, and many of the older children were sent to San Juan or Puerto Ayacucho to continue their schooling. There was no full-time shaman in the community, the captain being Evangelical, although illness episodes were sometimes blamed on forest spirits. Unlike the case in San Juan, there was no land pressure, and residents regularly visited the nearby large tracts of mature forest.

San Juan is the economic and political hub for the region, with about 1,000 people from at least 13 different ethnic groups (Centro Amazónico para la Investigación y Control de Enfermedades Tropicales 1997). It has a Catholic mission, an Evangelical church, a small hospital, shops, electricity, running water, and daily flights to the state capital. Most of the Wôthihã residents of San Juan (approximately 110) live in the same neighborhood (lit., “barrio Piaroa”), which was established in the 1960s. Most Wôthihã residents of San Juan claimed to be Evangelical or Catholic. As a hub, San Juan attracts people from all over the region, and the Wôthihã residents of San Juan have resettled from a variety of outlying communities since the 1950s. The kinship networks maintained with these communities have important implications for the transmission of ethnobotanical knowledge.

At the time of my fieldwork, no shaman lived full-time in San Juan. There was, however, a shaman who visited approximately once every two months and carried out healing sessions during his visits. Other shamans visited from time to time, and they were sometimes called on to perform curing sessions. The Wôthihã of San Juan mixed daily with criollos through their jobs as wage laborers, in school, in the shops, or in the health clinic. At least 50 percent of the residents spoke Spanish, and almost all the children attended school. Despite an informal and opportunistic involvement in the market economy, most Wôthihã relied on their subsistence crops on a daily

basis. Because of the relatively high population, there was some land pressure, with little mature forest within two hours' walk.

Qualitative Methods

In San Juan, I was recruited by community members to act as an interpreter and go-between when dealing with the hospital or with doctors, so I was able to observe the interactions between Wõthihã and biomedical practitioners. I also interacted frequently with hospital staff, including staying in the home of a senior nurse for a short period of time. I collected and recorded details on illness episodes presented to the clinics, the response of health care professionals, and the reaction in the community. I also noted deaths and their purported cause from both the Wõthihã community and the biomedical professionals. Whenever possible, I discussed the episode with both the Wõthihã and a member of the hospital staff.

Over the entire 18-month period, I spent considerable time in participant-observation, primarily with women and family groups. I accompanied them on their daily activities, including agriculture, food preparation, gathering wild plants, and child care. These activities usually occurred in the morning, leaving the afternoons free for structured interviews and daily unstructured interviews, which I conducted with nine of the households in San Juan, four of the nine households in Guara, and the single household in Caño Seje. These interviews focused primarily on daily activities and also on household activities, particularly those in home gardens. I also observed women preparing daily meals and medical treatments for household members.

Forest Plot Interviews

The data used to compare knowledge and use of wild medicinals are the result of 121 forest plot interviews in San Juan ($n = 60$), Guara ($n = 36$), and Caño Seje ($n = 25$), representing 55 percent, 72 percent, and 83 percent of the communities, respectively. The methodology used is a modified version of that described by Zent (2001). In each community, two forest plots were marked out: one in secondary forest immediately adjacent to each community (5×100 meters), one in San Juan in secondary forest ten minutes from the community (5×100 meters), and one in mature forest approximately 45 minutes' walk from Caño Seje and Guara (10×100 meters). There was no mature forest near San Juan, so there was no similar plot there.

Plots were laid immediately adjacent to the communities rather than some distance away to control for the possibility that people would be most familiar with vegetation closest to their homes. Vegetation type was also controlled for as much as possible, although this was difficult given the ecological diversity of the region. Within each plot, each tree or liana over ten centimeters in diameter at breast height was marked and measured, and a knowledgeable bilingual informant was interviewed about all before choosing representative individuals of each folk species.² I then carried out semistructured interviews with as many residents as would agree to be interviewed (see Table 1), asking them the names and uses of each of the species. The majority of the interviews were held in Wõthihã, using Spanish when possible

Table 1 Age and Gender of Interviewees

Age Group (years)	San Juan		Guara		Caño Seje		Total
	Male	Female	Male	Female	Male	Female	
8–17	5	6	4	3	3	4	25
18–40	14	17	9	11	6	7	64
40+	8	10	3	6	3	2	32
Total	27	33	16	20	12	13	121

Note. Because many Wōthihā do not keep track of their age, individuals' ages are often approximated based on their role in the community (married, with children, grandparent, etc.).

to add detail. In this way, I developed a database of 129 folk species used by and known to the Wōthihā in these communities. Of these, 30 were consistently reported to have medicinal use. Wherever possible, I interviewed each person in both plots, but in some cases this was impossible. The average number of responses by each interviewee is 44, with a standard deviation of 17 ($n = 121$).

To determine the “correct” answers, I developed a key based on male and female expert interviews, participant-observation of harvesting or plant-processing activities, and follow-up interviews with groups of people from different communities, particularly in San Juan. In some cases, more than one answer was considered correct. I noted variation between communities and between hunters and nonhunters. In a very few cases, alternative answers were not easily categorized. These were dealt with by a series of follow-up and group interviews with male and female experts and nonexperts. This was supported by a more general elicitation of Wōthihā botanical nomenclature and taxonomy (Heckler 2001). In this way, the key was modified, expanded, and adjusted as new interviews added to my understanding of Wōthihā taxonomy.

Based on the key, I was able to give a “plant knowledge score” to members of each community and each gender. I gave one point for each correct name and one point for naming a medical use; I divided this by total points possible (twice the number of plants). Although this method omits much of the richness and complexity of a folk taxonomy, it does offer a benchmark by which the three communities may be compared.

Home Gardens

My survey of home gardens was based on hand-drawn diagrams of house clearings, including all structures, water sources, and plants of all 13 households in San Juan, nine households in Guara, and the single household in Caño Seje. During my daily visits to people's homes (20–100 informal interviews in each household), I interviewed household adults and children for the name and use of each species. I interviewed a minimum of three household members on each home garden species. The numbers of plants and species in each garden were collated into a spreadsheet where I analyzed them by use and origin of the plant. The origins of the plants were determined by interviews with cultivators and community members; comparative work in the Herbario Ovalles, Central University of Venezuela, Caracas; the

botanical library at Royal Botanical Gardens, Kew, London; and regional flora and studies (Bennet and Prance 2000; Chitty 1985; Hoyos 1985; Schnee 1973; Steyermark et al. 1995–2006).

Because of the difficulty of deciding exactly when a cultivar stops being “introduced” and becomes “traditional,” I had to establish a benchmark. Because my concern with the origins of species is whether they are indicators of contact with other ethnicities and medical traditions, I consider that “traditional plants” are those cultivated by the Wõthihã before living memory (Heckler 2001; Overing and Kaplan 1988; Zent 1992); “introduced” are plants that have been introduced to the Wõthihã within living memory (Bennett and Prance 2000; Hoyos 1985; Steyermark et al. 1995–2006; and see below); and wild plants are those obtained or obtainable from natural occurring populations within the area utilized by the Wõthihã (Steyermark et al. 1995–2006).

Averages, standard deviations, one-way analyses of variance, and *t*-tests were calculated using SPSS 10.1.0. Figures were graphed using Microsoft Excel 2003.

Zent's Research

A direct comparison of the species cataloged by Stanford R. Zent and those cataloged in this study is impossible because, to protect the intellectual property rights of the Wõthihã, and on the explicit request of indigenous organizations representing their interests, neither Zent nor I have published the names and medicinal uses of which they can be considered the originators. However, I have compared my data with Zent's 1985–88 Upper Cuao study in three ways. First, I have used his published results, including floral inventories of wild and cultivated plants from his dissertation (Zent 1992). Second, I have reviewed his voucher specimens, deposited at Herbario Ovalles, Central University of Venezuela, Caracas, comparing them with the species that I identified in the Manapiare Valley. Third, I consulted with him repeatedly, including during joint trips to the Manapiare study communities, about observed similarities and differences.

Results

In total, I cataloged 84 folk species that were reported to have medicinal use among the Manapiare Valley Wõthihã, 30 fewer than Zent's 114 species. Given that I never intended to catalog the entire Wõthihã flora, but only to compare the different communities, conclusions cannot be drawn from such a discrepancy. However, some important conclusions can be derived from closer analysis of the data sets, including how the plants are managed, the origins of the species, and the explanatory framework in which they are embedded.

Wild Plants

The vast majority of Zent's 114 medicinal species grew wild in the forest and were never cultivated (Zent, personal communication, May 2001), whereas only 63 of the 84 medicinal species I cataloged grow wild, and only 49 have never been cultivated. Thirty of the wild species were identified only during the forest plot interviews,

Table 2 Results of Wild Medicinal Plant Interviews Analyzed by Gender

Test	Sample	Average (%)	Standard Deviation (%)	Significance
By community	San Juan (<i>n</i> = 60)	42.1	22.4	< .001 [†]
	Guara (<i>n</i> = 36)	52.3	17.7	
	Caño Seje (<i>n</i> = 25)	63.7	12.0	
All communities by gender	Male (<i>n</i> = 55)	53.2	20.4	.085*
	Female (<i>n</i> = 66)	46.6	21	
Each community by gender	San Juan male (<i>n</i> = 27)	50.2	22.5	.011*
	San Juan female (<i>n</i> = 33)	35.5	20.3	
	Guara male (<i>n</i> = 16)	49.3	20.2	.373*
	Guara female (<i>n</i> = 20)	54.8	15.5	
	Caño Seje male (<i>n</i> = 12)	50.3	22.5	.580*
	Caño Seje female (<i>n</i> = 13)	62.4	13.6	

Note. Analysis of variance (ANOVA) and independent samples *t*-tests were calculated by SPSS 10.1.0. Those in bold are significant.

[†]One-way ANOVA, *F* = 11.490, *df* = 2,118.

*Two-tailed, independent-sample *t*-tests, equal variance at a confidence interval of 0.95.

leaving open the possibility that, as Milliken and Albert (1996) found, they are known but not used. Despite Zent's assertion that Wôthihâ medicinal plant knowledge is "widespread, diffuse and generalized" (1997:340), only nine of those 30 species were identified as having a medicinal use by more than 50 percent of the interviewees. Thirteen of the 30 species were identified as having a medicinal use by fewer than 20 percent of the interviewees.

The average score for medicinal plant names and use was 50 percent, with a standard deviation of 21 percent. The difference between female and male scores is insignificant at a confidence interval of 0.95 (see Table 2). The three communities scored significantly differently, with Caño Seje highest, Guara middle, and San Juan lowest (see Tables 2–3), supporting the hypothesis that wild plant knowledge declines with socioeconomic transition, especially because San Juan scores reflect only secondary forest, which is the highest-scoring ecotype in the other two communities. When the scores are analyzed by gender, San Juan women scored significantly lower than San Juan men, whereas Guara and Caño Seje women did not score significantly differently than Guara and Caño Seje men (see Table 2). Guara women do have an observed mean higher than that of Guara men (55 percent versus 49 percent), which brings them close enough to the mean for Caño Seje women (62 percent) to not be significantly lower (see Table 3).

Figure 1 compares medicinal plant knowledge to knowledge of all plants. Caño Seje, as our proxy for a traditional community, presents a model with which the other communities may be compared. In Caño Seje, averages for knowledge of wild plants are very high (over 60 percent in all categories), but men scored slightly higher than women, and medicinal scores are slightly lower than scores for all plants for both genders. In Guara, however, women scored higher than men for all plants and medicinal plants, whereas in San Juan, women's knowledge of wild medicinal plants was markedly lower than in any of the other categories. In both San Juan and Guara, the nucleation of family units and the absence of a full-time shaman place more responsibility for health care on women. In Guara, women can respond

Table 3 Independent-Samples *t*-Tests of Wild Medicinal Plants by Community at a Confidence Interval of 95 Percent

<i>t</i> -Test	Significance
San Juan versus Guara	.016
San Juan versus Caño Seje	.000
Guara versus Caño Seje	.004
Guara female versus San Juan female	< .001
Guara female versus Caño Seje female	.150

Note. All significances are two-tailed, equal variance at a confidence interval of 0.95. Those in bold are significant.

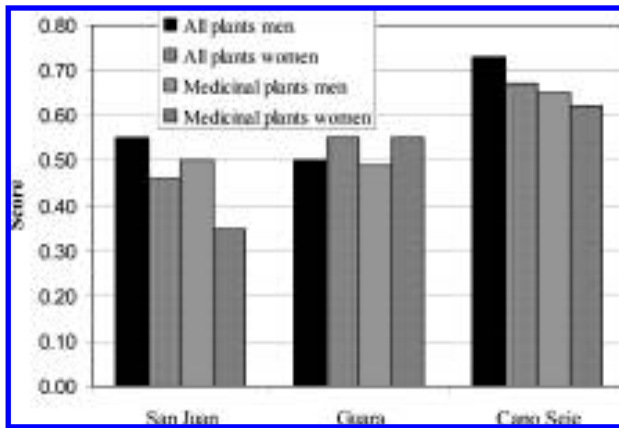


Figure 1 A comparison of how men and women from each of the three communities scored on interviews about medicinal plants. Naming competence for all plants is included for comparison. Note the difference between the women's medicinal plant scores in San Juan and Guara.

to this responsibility by utilizing wild medicinal plants; in San Juan, the lack of access to forest resources precludes this option, so they turn to other sources to find treatment options. The lower scores for Guara men probably reflect the practice of sending young men away to study. The three shamans interviewed scored highly but not more so than other people of their age. Indeed, the highest scorers were (male) hunters.

The low averages of San Juan men and women and Guara men suggest that knowledge of wild medicinal plants is declining (see Tables 2–3, Figure 1). How can I argue, then, that medicinal plant use is on the increase? A key factor in my argument is the marked increase of cultivated medicinal plants.

Cultivated Plants

As stated above, the vast majority of the medicinal plants identified by Zent were never cultivated by the Upper Cuao Wöthihã. In a scan of Zent's inventory of 51 garden plots, only two of the 71 cataloged cultivated species are identified as medicinal;

Table 4 Number of Home Garden Medicinal Species Grown in the Communities

Community	Wild Medicinal Species	Introduced Medicinal Species	Traditional Medicinal Species	Medicinal Species of Unidentified Origin	Total Medicinal Species	All Home Garden Species
Caño Seje	7	1	1	1	10	54
Guara	2	5	2	1	10	44
San Juan	8	8	4	2	22	77
Total	16	10	5	2	33	106

Note. The number of home garden species of any use is included for comparison.

another five were used medicinally by Wōthihā elsewhere but were not identified as such in Zent's (1992:194–198) study. In comparison, 36 (43 percent) of the 84 medicinal species identified during my study were under cultivation. Thirty-three of these were cultivated in Wōthihā home gardens.

All three communities cultivated medicinal plants in their home gardens (see Table 4). Only five of these medicinal species are traditionally cultivated in Wōthihā gardens and are listed—having a food, textile, or other use—in other Wōthihā plant inventories (esp. Overing and Kaplan 1988:330; Zent 1992:194–198). Sixteen species grow wild in forest known to the Wōthihā and have been transplanted or grown from wild seed in their gardens. Ten species have been introduced to Amazonas and to the Wōthihā within living memory (see Tables 4–5). The origin of the other two species is not known (see Table 4). In Wōthihā home gardens, then, at least 26 medicinal species have been brought into cultivation within living memory (79 percent of the medicinal species recorded during my home garden inventory and 30 percent of all medicinal species inventoried).

Medicinal Plant Use

The forest plot interviews and the home garden maps measured knowledge and management of medicinal plant species, not medicinal plant use. In Caño Seje, the most “traditional” of the three Manapiare communities and the only one with a full-time shaman, I saw very little use of medicinal plants. I was told that medicinal plants were used primarily for minor ailments, including colds, cuts, insect bites, snakebites, or skin rashes, or as stopgaps or supplements for shamanic treatment. Stopgap remedies are applied during hunting and gathering trips to the forest that may last for several weeks or months and are generally undertaken by small family groups. Shamans may not be present on these excursions, and minor injuries are common, especially the bites and stings that the medicinal plants in Zent's inventory were most commonly used for. Nevertheless, these remedies are not the first choice when at home, where, in Caño Seje, people depended on shamanism for their primary treatment, with a supplement of medicinal herbs, some of which were growing in the home gardens. During my time in Caño Seje, I saw only one medicinal species applied, *Bryophyllum pinnatum* (see Table 5), the only introduced medicinal species in that community (see Table 4).

In Guara, the success of the community business created relative affluence, so that obtaining necessary resources from the state capital or from San Juan, which some visited several times a week, was a viable option preferred by some residents, whereas

Table 5 Home Garden Medicinal Species That Have Been Introduced within Living Memory

Family	Scientific Name	Common Name	Comments
Acanthaceae	<i>Justicia secunda</i>	<i>raboratón</i> <i>lengua de suegra</i> , <i>mapanare</i>	In María's garden; from Lesser Antilles, distribution limited in Amazonas (Steyermark et al. 1995–2006)
Agavaceae	<i>Sansevieria</i> sp.		In María's garden; from tropical Africa (Hoyos 1985)
Apocynaceae	<i>Thevetia peruviana</i>	<i>Retama</i>	Cultivated in hot, dry regions of Venezuela (Hoyos 1985); poisonous
Cactaceae	<i>Pereskia guamacho</i>	<i>guamacho</i> (Steyermark et al. 1995–2006)	Widespread elsewhere in Venezuela (Steyermark et al. 1995–2006)
Crassulaceae	<i>Bryophyllum</i> spp.	<i>hoja colombiana</i> , <i>tonina</i>	In María's garden; not in any regional flora
Euphorbiaceae	<i>Jatropha gossypifolia</i>	<i>tuatua</i> (Hoyos 1985)	Widespread in dry areas of northern Venezuela (Hoyos 1985)
Lamiaceae	<i>Mentha</i> sp.	<i>menta</i>	From Catholic nuns; used to treat colds
Lamiaceae	<i>Ocimum micranthum</i> L.	<i>albahaca</i>	From garden at the Catholic mission
Poaceae	<i>Cymbopogon citratus</i> (D.C.) Stapl.	lemongrass	For colds and respiratory problems; from Asia, perhaps India
Tiliaceae	<i>Triumfetta semitriloba</i> Jacq.	<i>wiri ohiya</i> ; <i>cadillo perro</i>	In María's garden; from Isla Margarita (Hoyos 1985)

frequent hunting, gathering, and fishing excursions to the forest were preferred by others. Manufactured health products purchased by Guara residents included over-the-counter analgesics, antiseptic skin creams, and soaps. This affluence, however, was relatively recent and not particularly secure, so most people would have experienced periods during which they were required to obtain necessary resources from the forest, regardless of their preferred source.

Despite the high medicinal plant use scores for Guara women, I never saw a wild medicinal plant species used. The species I did see used, including *Bryophyllum pinnatum*, *Citrus aurantifolia*, and *Pereskia* sp., were introduced home garden species. Another commonly used medicinal species was *Oenocarpus bataua*, the oil of which is sold throughout Amazonas State as a remedy for chest colds.

The use of medicinal plants in San Juan was much more prominent and complex. I saw store-bought remedies and cultivated medicinal plants used in a variety of circumstances, but only a few of the medicinal species known were used, including introduced species such as *Cymbopogon citratus*, *Justicia secunda*, and *Bryophyllum pinnatum* (see Table 5) and those in widespread use throughout Amazonas State,

such as *Citrus aurantifolia* and *Oenocarpus bataua*. Thus, San Juan was marked by regular use of a few introduced and cultivated medicinal plant species and infrequent use of a wide variety of wild species.

An analysis of this data has highlighted some significant shifts in the knowledge and use of medicinal plants in the last few decades. Although many wild medicinal species are known, they do not seem to have been regularly used for at least two decades, as indicated by Zent's study and suggested by earlier ethnographies. A comparison of the different communities in the Manapiare region indicates a decline of general wild plant knowledge as communities become more involved in the market economy and national society. Wild medicinal plant knowledge, however, shows distinct trends, depending on the community and the availability of other medicines, such as biomedicine, purchased folk remedies, or cultivated medicinal plants. A close analysis of cultivated medicinal plant species shows two major trends: (1) a tendency to use only a few of the medicinal plant species available and (2) a tendency to bring medicinal species into cultivation that have never been cultivated before, the most regularly used of which are introduced from other parts of the world.

Biomedicine in San Juan

The scaled-down and underfunded version of biomedicine in Manapiare during my main study was perceived with fear and distrust.³ Doctors were stationed in San Juan for a maximum of two years before being replaced by someone else and, as such, were always strangers. Moreover, the clinic is located in the criollo neighborhood, which, until after my fieldwork, was under the control of an opposing political party. Some doctors, including the one serving during the majority of my fieldwork, were supporters of this opposing party, thereby becoming enemies of the Wõthihã community. Their motivations came to be distrusted to the extent that the Wõthihã attributed the regular shortages of medicines to willful withholding of treatment. Visits to the clinic were seen as forays into enemy territory to seek assistance from a dangerous stranger. The threat inherent in the contact was greatly enhanced by the frequency with which the doctor, with limited equipment, was unable to treat very serious illnesses and immediately sent patients away to hospitals in Puerto Ayacucho or even Caracas, where they sometimes died alone. This was often done with a demeanor of authority that effectively cut family members out of the decision-making process.⁴ The danger inherent in this activity has particular significance, given the Wõthihã conceptual affiliation between power and danger. Biomedicine is conceived as a new and only slightly understood powerful force, which the doctor controls, just as shamans are able to control the productive power that is necessary for life but can also cause illness. If the doctor behaves as an enemy, then Wõthihã will not risk further harm by visiting the clinic.

Nevertheless, the efficacy of pharmaceuticals, particularly for treating introduced epidemic diseases, has not gone unnoticed by the Wõthihã. During my stay, I was bombarded with requests for aspirin, acetaminophen, and antibiotics, often as alternatives to a visit to the hospital. These pharmaceuticals are seen as being curative of symptoms but without the danger of the doctor's power. In other words, pharmaceuticals are classified along with herbal remedies as being morally neutral, symptom-specific treatment and yet, unlike wild medicinal plants, highly effective

at dealing with new and devastating illnesses. This reinforced a general confidence in the efficacy of symptom-specific treatments in general. To the Wõthihã, the prescriptions of a doctor, the suggestions of a pharmacist, and the recommendations of a criollo, mestizo, or non-Wõthihã indigenous herbalist belong to the same conceptual category: reductive and symptom specific. In the days when shamanism was predominant, they were not seen to be particularly effective, but riverine perceptions of shamanism are shifting drastically.

Riverine Shamanism

Space does not permit a full consideration of the dynamics of shamanism in the changing Wõthihã world. However, a few points are significant to the argument here. Missionaries, both Evangelical and Catholic, strongly disapprove of shamanism, and the Wõthihã to whom I spoke unequivocally attributed the decline of shamanic activities to Christian prohibition. Rather than having a full-time shaman in each community, shamanic treatment only occurred in San Juan and Guara when a shaman visited from surrounding communities, usually no more than once a month. When a shaman was in town, he spent much more of his time treating the illnesses of specific patients than he did maintaining social harmony. Indeed, I never heard singing, and other informants told me that it was something that did not happen anymore in San Juan but only far away in the forest ('yo, de'ana!). Shamans in San Juan cured by "blowing" (Sp. *soplando*), without accompanying singing. Nevertheless, the irregular curing sessions that I witnessed in San Juan were popular, and San Juan residents sometimes visited other communities to seek shamanic treatment, perceiving it to be more reductive, incident specific, and separable from daily life. Shamanism, as perceived and used by lay Piaroa, is changing dramatically from the embedded, moral authority described above to a more pragmatic activity with bounded areas of expertise (Heckler 2006).

New Herbal Traditions

The absence of a full-time shaman and the nucleation of family units in San Juan and Guara have created a new conceptual and temporal space in treatment regimes. Whereas previously a health specialist was immediately and intimately involved with the majority of illness episodes, now family members must make initial diagnoses and determine appropriate treatment. Thus, the role of the informal healer has become much more significant, and the person who fills that role is usually a female family member who must select from an increasing variety of treatment options. These options include medicinal plants from the forest, home gardens, or neighbors; over-the-counter pharmaceuticals or criollo folk remedies; a visit to a shaman; or a visit to the hospital in San Juan or to a medical clinic in another community. The order in which these steps are taken depends on many variables, including the type of illness; religious affiliation; social factors such as how close the family is to a shaman, doctor or nurse, or any other health specialist; or practical concerns such as whether a shaman is in town, whether the shops or hospital currently have medicines available, or whether the family has the money or ability to travel.⁵

In many cases, the most widely available, spiritually neutral, and inexpensive option is herbal treatment. However, herbalism is not an undifferentiated and “traditional” category. In fact, the diverse sources of the medicinal plants used and cultivated in San Juan and Guara suggest that various medical traditions are being adopted by the Wōthihā. In San Juan, I identified two primary sources of medicinal plant species, each of whom brought that knowledge from their own healing traditions and each of whom represented a model of the herbalist as female using exclusively cultivated plants: the nuns from the Catholic mission and a Yabarana herbalist with ties to the Caribbean coastal region of Venezuela.

Catholic Nuns

One day, while I was sitting outside a house where a woman was suffering from the flu, a nun with about five or six teenage students in tow, some of them Wōthihā girls from the barrio, arrived bearing an armful of mint (*Mentha* sp.). She was greeted with enthusiasm, and the mint was immediately boiled into a tea for the patient. Later, I saw a Wōthihā gardener who worked in the mission garden bringing home some basil (*Ocimum micranthum* L.) that the nuns had given him to treat his young daughter’s cold (see Table 5).

The Catholic nuns, many of whom are from peasant communities in other parts of Venezuela and Colombia, bring with them a belief in *curanderos* and herbalism that is deeply infused with Catholic symbolism. Press (1971) and later Taussig (1987) have described Colombian and Putumayan healers who invoke images of Catholic saints, use prayer, and refer their patients to priests. As the San Juan nuns pray for the recovery of a sick patient, they also prescribe and give medicinal plants to community members. As they discourage shamanism, they encourage the use of herbs as charms, incense, and votive offerings. And as the main schoolteachers in San Juan, they have taught these beliefs to a generation of Wōthihā girls.

Yabarana Herbalist

One afternoon, I arrived at a Wōthihā friend’s house to find her bathing her feverish baby in what looked like dark pink dye. I asked her what it was called, and she replied that she did not know, that her neighbor, María, had given it to her.⁶ I had already heard about María’s herbal expertise from other residents of San Juan, both mestizo and indigenous. María is one of the 15–20 Yabarana, a Carib-speaking group, who live in the Wōthihā barrio and often intermarry with them (OCEI 1995). She said that she is often consulted by her Wōthihā neighbors in times of illness; not only do they ask for plants and information, but also her propagules and planting styles are making their way into Wōthihā gardens (see Table 5).

Unlike most other gardens in the neighborhood, María’s was surrounded by a one-meter-high fence. The febrifuge that my friend had been using (*Justicia secunda*) was scrambling over the fence. The arrangement of the plants in beds with borders and paths running between was strikingly different from the asymmetrical, ecological planting approach of the Wōthihā. Rather than being largely dedicated to food plants, as were most of the Wōthihā home gardens, María’s garden was dominated

by medicinals, good luck charms, plants to ward away snakes and evil spirits, and plants to bring intelligence to children.

The list of species that I found in her garden reflects the ethnicities of María and an affine, who also took an active interest in medicinal plants. María's affine is from Isla Margarita, an island off the Caribbean coast of Venezuela. Several species in their gardens are listed, with the same common name, in *Flora of Isla Margarita* (Hoyos 1985). These species, including *Bryophyllum pinnatum*, *Pereskia guamacho*, and *Sansevieria* spp., are not native to Amazonas (Dennis 1988; Schnee 1973; see Table 5). The Caribbean region of Venezuela is strongly influenced by African culture and is the seat of at least two forms of African-based healing traditions (Voeks 1993:70). The possibility of African influence is indicated by several species of *Bryophyllum* (Crassulaceae) found in María's garden, the origins of which are Madagascar and East Africa (see Table 5).

Given the paucity of ethnographic information about the Yabarana, our best clues about what aspects of Yabarana tradition María may have incorporated come from the excellent studies of other, nearby Carib groups. One such study is Guss's (1989) ethnography of the Ye'kuana. In it, he refers to "women's herbs," which "include plants to heal children, ease menstruation, aid or prevent birth, cure or produce fever, frighten snakes, stop rains, secure lovers, induce sleep, dispel ill humor, deter evil spirits, protect travelers and cause death" (1989:35). With the exception of the last category, this list is remarkably similar to what was in María's garden, even down to some of the species being cultivated (i.e., *Caladium* spp. [Guss 1989:57]).

There is no evidence of "women's herbs" being grown by Wôthihã women. In fact, Wôthihã home garden medicinals were mainly used to treat physically salient conditions such as skin diseases, diarrhea, and fever. The single exception to this rule is *Sansevieria* spp., which, as a charm against snakes, represented a concrete fear for the Wôthihã. There was some indication that the Wôthihã were also adopting María's planting practices. Three gardens of Wôthihã who were closely connected to María through kinship or exchange relationships had small beds of medicinal plants, largely introduced species, delimited by pebbles, planted in pots or containers, or fenced off in a way not seen in the other gardens.

The Wôthihã, however, were not simply adopting practices from different traditions but, rather, selectively adopting those that made sense to them and, sometimes, changing the use and names of the plants to fit in with their own cosmology. For instance, during my fieldwork *Bryophyllum pinnatum* was the most regularly used medicinal plant and had disseminated as far as Caño Seje, where it was the only introduced medicinal species. When a baby was born, sap from the plant was smeared on the umbilical cord to prevent infection and to "help the cord dry up and fall off cleanly." The immediate source of this plant was María's garden, yet she reported that it was used to treat bone and toothache. After some investigation, I found that the Wôthihã had applied the doctrine of signatures, a doctrine that they also often apply to wild medicinal plants. The plant's most salient feature is that it bears small leaflike propagules on the margins of the leaves that fall off and take root, producing new plants. Although the Wôthihã mostly reported that the plant did not have a name (María called it "hoja colombiana" or Colombian leaf), they showed me the "babies" on the leaf margins when explaining its efficacy, symbolically associating it with birth and maternity. However, the fact that the propagules mature and

then fall off also represented the drying out and falling off of the umbilical cord. The Wōthihā have applied a double symbolism that clearly points to the plant's "natural" use. Interestingly, *B. pinnatum* and a few closely related species, having originated in Madagascar, are listed as a treatment for rashes and other dermatological problems in traditional pharmacopoeia around the world (Bodner and Gereau 1988; Dennis 1988:18–22; Rao and Jamir 1982:179; Secoy and Smith 1983:49). In applying a unique symbolic logic to an introduced medicinal species, the Wōthihā are choosing, adapting, and incorporating species and techniques into their own medical system.

Conclusion

There are no reliable accounts of the situation before Milliken and Albert's purported "knowledge bottleneck." It is highly probable that epidemic diseases have had a profound effect on medical cosmologies in Amazonia, and it is widely acknowledged by Wōthihā that biomedical treatments are often more effective than shamanism in treating these epidemics. Nevertheless, it does not automatically follow that the marked decline in the pervasiveness and scope of shamanism is directly related to the success of biomedicine, nor is the use of herbal remedies, although often considered traditional medicine, in direct competition with biomedical treatment. The decline in shamanism is more attributable to Christianity (Heckler 2006), whereas the success of biomedical treatments, when they are available, has validated the use of herbal remedies in their absence. The evidence presented here points to a shift from a medical cosmology privileging the shamanic epistemology, in which medicinal plants are considered to be supplemental or stopgap treatments, to one privileging a reductive, symptom-specific approach to illness, in which medicinal plants are central. This, combined with a higher proportion of the population living in nuclear family units in larger, sedentary communities, has led to significant changes in who deals with illness and how it is dealt with, including a gender shift.

There is nothing inherently female in the domain of Wōthihā medicinal plants. Indeed, in Caño Seje, men scored slightly higher than women, and, as mentioned before, hunters in all three communities scored highest. However, social and economic change is widening what was a relatively minor gender division, with more men entering the workforce and focusing on market agriculture, while women are left largely in charge of subsistence gardens, home gardens, and child care. With children in school and fewer extended relatives in the economic unit to help care for very small children, women are less able to travel (Heckler 2002) and must find solutions to illness episodes nearby. In San Juan, this often precludes the use of shamans or wild medicinal plants, and, because women are less likely to visit or to successfully communicate their needs to a doctor, it often precludes biomedicine. Instead, women must find new means of treating the family members for whom they are responsible. They find support in this endeavor from other women in the communities in which they live—in this case, Catholic nuns and Yabarana neighbors. As women usually are responsible for the informal healing in the traditions that María and the nuns have learned their herbalism from, they assume that it is a female role and freely share their knowledge and interest with Wōthihā women. And as women in multiethnic communities adopt these new techniques, their kin who visit from other

communities learn and take propagules back to their own communities. Thus, the travel of medicinal plants from one community to another represents an exchange not only of biological material but also of diverse medical traditions.

Outsiders, including some researchers, who come in search of traditional medicinal knowledge often assume that women are the holders of this knowledge and demonstrate their assumptions by asking Wõthihã women about medicinal plants. For the Wõthihã of San Juan and Guara, who are astute observers of the society into which they are integrating, these external validations are highly significant. Much of the economic development with which they are involved, for example the sale of indigenous manufactured arts and crafts, traditional remedies, and wild honey, as well as ecotourism, demonstrates to them that an externally derived version of traditional culture has value in this new world of market economies. The exogenous identification of the Amerindian with plant medicines is pervasive (e.g., Schultes and Raffauf 1990), and the Wõthihã are becoming increasingly aware of this fact. This external expectation and the economic benefit that it brings to local peoples will encourage herbalism to become a gendered and formalized practice. We may soon see the emergence of a new class of female Wõthihã *herbalistas*, who will be identified as traditional yet, in reality, represent a new hybridization of healing and religious traditions. Not only is Wõthihã medical practice changing to fit new constraints and opportunities, but, paradoxically, it is changing to become more like what outsiders always thought it was.

Notes

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1. The term *criollo* is used to describe a Venezuelan national. Because of the multiethnic background of most Venezuelans and their cultural distinctiveness, the Wõthihã consider them to be different from “whites.” In Amazonas, a mestizo is a person with mixed indigenous and criollo parentage.

2. Although most folk species identified correspond to a single botanical species, some inconsistency in botanical nomenclature in certain taxa, difficulty in identifying some species, and the overall purpose of the study caused me to use folk classification where the two differ.

3. In 2004, after the Chávez government brought in Cuban doctors, the situation improved markedly.

4. For an excellent discussion of these points and other problems that the current biomedical system faces in treating indigenous communities in Amazonas State, see Toro 1997.

5. The Wõthihã told me that they only visit the doctor for fever, diarrhea, and vomiting. Dermatological problems, difficult births, and severe injury, among other things, were not brought to the attention of the doctor until the problem had become so severe that the patient was feverish.

6. Names have been changed to protect confidentiality.

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